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OFFICE OF THE VICE PRESIDENT—
AGRICULTURE AND NATURAL RESOURCES

OFFICE OF THE PRESIDENT
Division of Agriculture and Natural Resources
300 Lakeside Drive, 6th Floor
Oakland, California 94612-3560

July 25, 1997

CALFED Bay-Delta Program
1416 Ninth Street, Suite 1155
Sacramento, California 95814

On behalf of The Regents of the University of California and Vice President W.R. Gomes, enclosed is one original and nine (9) copies of the proposal entitled "Alternative Practices for Reducing Pesticide Impacts on Water Quality". The Project Leader is Frank Zalom, Director, University of California Integrated Pest Management Program.

Any questions concerning the project work should be directed to Dr. Zalom at (916) 752-8350. Questions regarding administrative matters such as contracts or other award documents should be directed to my attention at: University of California, Division of Agriculture and Natural Resources, 300 Lakeside Drive, 6th Floor, Oakland, CA 94612-3560.

Sincerely,

A handwritten signature in cursive script, appearing to read "Carol Berman".

Carol Berman
Contracts and Grants Coordinator
(510) 987-0050
/ht

cc: F. Zalom
without enclosure

DMR WAREHOUSE
97 JUL 28 PM 3:15

EXECUTIVE SUMMARY DWR WAREHOUSE

a. Title and Applicant Names: ALTERNATIVE PRACTICES FOR REDUCING PESTICIDE IMPACTS ON WATER QUALITY. Dr. Frank Zalom, Dr. David Hinton, and Dr. Don Erman

b. Project Description and Primary Biological/Ecological Objectives: This Group 3 (services) proposal will identify, promote, and monitor alternative practices to reduce biological impacts of pesticides on the water quality of all priority aquatic habitats identified by CALFED.

Toxicity to all three of the EPA bioassay species (larval fish, zooplankton and algae) is commonly detected in the Sacramento and San Joaquin Rivers and the Delta. Our Aquatic Toxicity Laboratory has provided the State Water Resources Control Board with conclusive evidence linking some of this toxicity to certain pesticides. In particular, diazinon and chlorpyrifos have been linked to orchard spraying and urban runoff. U.C. research and education programs similar to the one proposed here, in partnership with agencies and industry, have greatly reduced impacts of the rice industry, particularly from herbicides. This proposal offers Phase II of a program to address pesticide impacts from other agricultural and urban sources.

Startup funding for the program (Phase I) was granted by the State Water Resources Control Board (SWRCB) to focus on alternatives to diazinon and chlorpyrifos used as dormant sprays for stone fruit and almond production. Three primary goals of Phase I included: 1) Identification of alternative agricultural practices designed to prevent or reduce offsite movement of pesticides into surface waters; 2) Outreach and education regarding alternative practices; and 3) Design of monitoring projects to assess the success of these practices in preventing or reducing offsite movement of pesticides into surface waters. Phase II proceeds as follows:

c. Approach/Tasks/Schedule

Information Synthesis and Outreach: A comprehensive review of data currently available on alternative approaches will provide an information synthesis of interactive variables (e.g. efficacy, economics, and potential impacts) in an educational document ("Alternative Practices Matrix"). Phase I material will be expanded to cover alternatives for stone fruit and almonds. This information will educate agricultural pesticide users on the problems associated with current practices, the benefits of alternatives. By review, extrapolation, and interagency databases we will expand matrix material to reflect alternative practices, prioritize target audiences, and initiate an urban education program. The problem, use data indicate that annual use of both diazinon and chlorpyrifos exceeds use for any single agricultural crop; alternative outreach programs need to be devised.

Monitoring Studies: Phase II will enhance and build on the monitoring studies of various alternatives to diazinon and in-season sprays. A master protocol for monitoring will be developed, including criteria for site selection. This protocol defines parameters for measurement, analytical procedures, and data evaluation.

Phase II monitoring studies will be coordinated with U.C. Cooperative Extension personnel in Stanislaus County and will span 3 seasons of dormant and in-season practices to compare the pest control efficacy and water quality influences of traditional applications of diazinon and chlorpyrifos to a variety of alternative practices. Stanislaus County will also be the initial focus of better defining the major urban uses of diazinon and chlorpyrifos.



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Efficacy of the educational outreach program in reducing pesticide contamination of surface waters will be measured by intensive follow-up with workshop participants by a rural sociologist who has previously conducted these types of studies.

This 3-year proposal will complete all tasks by December 31, 2000. Future phases of this program will expand information synthesis, outreach, and monitoring to address alternatives for all uses of diazinon and chlorpyrifos as well as alternatives to other pesticides used in urban and agricultural settings.

d. Justification for Project and Funding by CALFED: University of California research facilities and personnel, in conjunction with its statewide Cooperative Extension advisor network, have a recognized tradition of high quality applied-level research and education programs; experience, expertise, and infrastructure enable the tasks of this contract to be accomplished in a timely and efficient manner. Additionally, current funding for Phase I (\$130,000) has already afforded our program significant approval, support, and active participation of several agricultural commodity boards, U.C. Cooperative Extension county advisors, and state agencies.

e. Budget Costs and Third Party Impacts: TOTAL REQUEST FOR 3 YEARS = \$957,781

Breakdown of Request: Toxicology Monitoring = \$574,467; Pest Management

Monitoring = \$247,015; Evaluation & Outreach = \$49,228; Overhead = \$87,071

No third-party impacts are anticipated.

f. Applicant qualifications:

Dr. Frank Zalom, Director, Integrated Pest Management Project, U.C. Davis. Has published over 250 technical, semi-technical, and popular articles on various aspects of insect biology and control. Elected a Fellow of the California Academy of Sciences in 1990. Awarded a Fulbright Senior Research Fellowship in 1992-93. The UC IPM program was recognized by a California Legislature Joint Resolution for improving pest management practices.

Dr. David Hinton, Director, Center for Ecological Health, U.C. Davis. Faculty member in the US EPA - UC Davis Center for Ecological Health Research; the National Institute of Environmental Health Sciences - UC Davis Superfund Basic Science Research Program, and leads a large effort on inland surface water toxicity studies funded by various State of California agencies. Has published 147 papers, 99 abstracts, and is editor-in-chief of *Aquatic Toxicology*.

Dr. Don Erman, Director, Centers for Water and Wildland Resources, U.C. Davis. Professor of fisheries ecology, conducts research on impacts of land use on aquatic systems. Science Team Leader for the \$7-million Congressionally mandated Sierra Nevada Ecosystem Project. Serves as the U.C. representative to the California Biodiversity Council.

g. Monitoring and Data Evaluation: Monitoring is the essence of this proposal. We will utilize the skills of a proven rural sociologist to monitor the efficacy of our outreach efforts to influence adoption of alternatives to diazinon and chlorpyrifos. We will establish high quality field demonstration sites that will afford reliable samples for monitoring pest control efficacy and water quality impacts of traditional versus alternative practices.

h. Local support/coordination with other programs/compatibility with other CALFED objectives: We have contacted representatives from Department of Pesticide Regulation, State Water Resources Control Board, Almond Board of California, California Tree Fruit Agreement, California Prune Board, UC Cooperative Extension Stanislaus County, California Agricultural Production Consultants Association, and Coalition for Urban-Rural Environmental Stewardship who have agreed to serve on an advisory committee for this project.

ALTERNATIVE PRACTICES FOR REDUCING
PESTICIDE IMPACTS ON WATER QUALITY

Applicant: The Regents of the University of California

Dr. Frank Zalom, Dr. David Hinton, and Dr. Don Erman

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Dr. David Hinton, Professor and Leader, UC Systemwide Graduate Program in Ecotoxicology Davis, CA 95616. Phone: (916) 752-6413, FAX: (916) 752-9692,
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Dr. Don Erman, Director, Centers for Water and Wildland Resources, University of California, Davis, CA 95616. Phone: (916) 752-8070, FAX: (916) 752-8086,
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Participants/Collaborators in Implementation:

Michael Oliver, Research Associate, Centers for Water and Wildland Resources, University of California, Davis, CA 95616. Phone: (916) 752-7992.

Phil Osterli, Stanislaus County Director, UC Cooperative Extension, 733 County Center III Court, Modesto, CA 95355. Phone: (209)525-6654.

RFP Project Group Type: Other Services



Date 7/28/97

Frank Zalom, Director, Integrated Pest Management Project



Date 7/25/97

Carol Berman, Contracts and Grants Coordinator

III. Project Description

a. Project Description and Approach

This project is an expansion (Phase II) of a program which received startup funding from the California State Water Resources Control Board. Phase I focused only on alternatives to diazinon and chlorpyrifos when used as dormant sprays for stone fruit and almond production. Three primary goals of Phase I included: 1) Identification of alternative agricultural practices designed to prevent or reduce offsite movement of pesticides into surface waters; 2) Outreach and education regarding alternative practices; and 3) Design and initiation of monitoring projects to assess the success of these practices in preventing or reducing offsite movement of pesticides into surface waters.

This Phase II project expands the focus of the three goals to also address in-season agricultural and large-scale urban uses of diazinon and chlorpyrifos. Most importantly, this proposal greatly expands the monitoring studies to compare the pest control efficacy and water quality impacts of alternative practices versus traditional pesticides. Future phases of this program will address other pesticides of water quality concern and both urban and agricultural use practices. Tasks associated with the three main goals are as follows:

Task 1: Compile the current knowledge of pest management practices that are alternatives to diazinon and chlorpyrifos. The currently fragmented information on these alternatives will be compiled from scientific journals, research reports, and unpublished (anecdotal) investigations primarily found at the U.C. Cooperative Extension county level of ongoing applied research.

Task 1.1: Produce an information synthesis document, the Alternative Practices Matrix, which will display a comprehensive set of interactive variables relative to alternative practice economics, efficacy, and environmental impact potentials. A key feature of this matrix is that it will highlight areas of needed research wherever information is missing in the matrix format.

Task 2: By following the tradition of highly successful producer training programs developed and administered by the University of California and its Cooperative Extension network in the counties, programs will be developed to provide agricultural producers with the necessary understanding of problems associated with current production practices so that adoption of better alternatives can be accomplished in the interest of economic viability of impacted industries. This project will provide a detailed assessment of the current knowledge of water quality problems associated with pesticide use while offering substantive alternatives.

Phase II education and outreach for urban users of diazinon and chlorpyrifos will define the main urban uses of diazinon and chlorpyrifos, establish the most appropriate priority of audiences to address (licensed applicators, wholesale/retail nursery distributors, residential users), and identify the most appropriate means of gaining access to these audiences (continuing education for licensees, association meetings, retail-level handout materials).

A Steering Committee composed of representatives from various agricultural commodity boards, pesticide applicator associations, state water and pesticide agencies, and U.C. faculty and Extension advisors will serve to guide and review the development of matrix materials, administration of outreach programs, and monitoring studies.

Task 3: We will develop a master protocol for monitoring studies that will clearly identify the criteria for selecting a site to study the efficacy of an alternative practice on pest control and on improving water quality. The master protocol will define the parameters to be measured or described, the methodology of measurement, and the analytical processes for data production and evaluation. Data from monitoring studies will yield new information with the local specificity critical to successful interpretation and future management planning.

WATER QUALITY MONITORING

Two locations (one using alternative and one using conventional practices) of matching area and physical characteristics will be selected for each dormant and in-season comparison. Incoming waters (rain or irrigation) and tail waters will be tested to quantify offsite movement of pesticides. Quantification will be achieved through analytical chemistry and toxic unit accounting (i.e. actual toxicant concentration present in a sample divided by the 96-hr LC-50 for the species of interest). The activation for dormant spray testing will be a precipitation event of ½ inch or greater. Modeling of amount of acreage adopting alternative practice and anticipated reduction of offsite movement will be used to determine targets for use reduction in specific watersheds.

In-season monitoring on a pilot scale was conducted this year for Sacramento and San Joaquin River drainages. Toxicity "hits" indicated toxic conditions were experienced during the period April-July when sensitive early life stages of fish were present. Our in-season monitoring will determine the effect of irrigation practice (sprinkler, drip, or flood) on offsite movement of pesticides and their alternatives.

Water quality monitoring will determine whether reduction of offsite pesticide movement follows adoption of alternative practices, and, if so, whether toxicity to test organisms is diminished. Two of the standardized US EPA test organisms will be used: the fathead minnow (*Pimephales promelas*) and the water flea (*Ceriodaphnia dubia*). In addition, highly selective analytical chemistry and toxicology endpoints will be used to determine presence and concentration of specific agents in irrigation and drain waters to establish that toxicity encountered is due to agents of concern.

Standard acute US EPA *Ceriodaphnia dubia* and chronic fathead minnow toxicity tests will be used. A toxic sample is defined as one in which mortality in a sample is significantly higher than a laboratory control sample. We are a certified laboratory for toxicity testing and all methods are currently in practice. To establish number of toxic units present in the sample, dilution tests will be used. The number of toxic units per sample permits quantitative comparison between alternative and conventional sites. We shall follow EPA guidelines for determination of various water quality parameters. Finally, analytical chemistry will be conducted on both irrigation water and tailwater. Quality assurance/quality control measures include monthly reference toxicant testing, designation of 10% of the samples to QA matrix spikes, blanks, duplicates, etc. All data will be accepted if they meet EPA criteria for test acceptability.

Recognizing that chronic bioassays need to be developed which will use indigenous species, we have selected candidate organisms on the basis of their role in the food web of CALFED-identified, endangered, and/or listed fish species. Organisms include: a rotifer (*Brachionus* species); a benthic midge (*Chironomus* species); a cladoceran (*Bosmina* species); a cyclopoid copepod; and an amphipod (*Corophium* species). In addition, the inland silverside fish (*Menidia beryllina*) will be tested for its suitability for toxicity bioassay including early life stages.

Because our laboratory employs the standard US EPA three species tests on surface water samples weekly, the potential to test and compare results of these indigenous species in a side-by-side evaluation with conventional tests is a strength of our proposed work.

Another objective is to develop Toxicity Identification Evaluation (TIE) Procedures to characterize synthetic pesticides, one of the emerging alternative family of pesticides to the more conventional organophosphates. TIE "fingerprints" for specific pesticides can be more sensitive to biologically active concentrations of highly toxic chemicals than current analytical methods. Our laboratory has already established the 96-hr LC-50 concentration for two synthetic pyrethroid pesticides (Ambush and Asana) which are potential alternatives to diazinon and chlorpyrifos for the target pests in the crops we are studying. We have fingerprinted the chemical behavior of these two pyrethroids in Phase I TIEs. With the proposed funding, we will complete the fingerprint process in Phase II TIEs with the expected benefit of identification of new synthetic pesticides as causes of detected toxicity.

PEST CONTROL MONITORING

Efficacy of diazinon and chlorpyrifos will be compared to alternative treatments for control of peach twig borer and scale insects in a replicated field trial and in the larger orchard blocks where the Toxicology monitoring will be conducted. Our experience has shown that evaluation of pest control strategies in orchards requires both ample replication within an orchard and the presence of pests. Sufficient replication for evaluation of pest efficacy is frequently not possible within the larger blocks required for toxicology monitoring, and the target pest(s) are not always present. Results from the smaller replicated experiments and the larger experimental units will be linked through the rate of any pesticide being applied. Treatments may consist of the target organophosphates, alternative conventional pesticides (carbamates, pyrethroids including Ambush and Asana), microbial or other biologically-based pesticides that are generally regarded as "safe" (for example *Bacillus thuringiensis*, Spinosad and pheromones), in season (rather than dormant season) applications of these materials, and reduced rates of application. At least 6 replicates of candidate treatments will be arranged in completely randomized blocks. Efficacy will be determined by counting twig strikes in the spring and bands placed around tree scaffolds to capture larvae (peach twig borer), and by sticky tape bands and pheromone traps for scales. Treatments in the larger plots must be fewer to accommodate the toxicology monitoring, and will be selected from the universe of possibilities based upon our matrix analysis as those which are most likely for growers to adopt because of cost and reliability. The same pest monitoring methods will be employed as within the smaller plots, but damage at harvest will also be determined through quality assessments of fruit or nut samples.

OUTREACH MONITORING

Efficacy of the education and outreach program at reducing pesticide contamination of surface waters will be measured by an intensive follow-up protocol administered by a rural sociologist who has previously conducted these types of studies. The sociologist will contact all participating growers to ascertain what changes, if any, they have incorporated in their management as a result of outreach training for alternative practices.

b. Location and/or Geographic Boundaries of Project

The education/outreach component of this phase of our work will be coordinated regionally with Cooperative Extension offices representing counties whose agricultural pesticide uses potentially impact the Bay-Delta. These include, but are not limited to, Glenn, Colusa, Butte, Sutter, Yuba, Yolo, Sacramento, San Joaquin, Stanislaus, and Merced counties.

The focus of urban pesticide user education/outreach will initially be in Stanislaus County. Monitoring studies for pest control and water quality will also focus initially on Stanislaus County.

c. Expected Benefits

The primary CALFED stressor addressed by this proposal is water quality. The project focuses on education as a vehicle to remediation, and monitoring for measures of educational efficacy and quantitative measures of pest reduction and water quality improvement. All aquatic habitats identified as priorities by CALFED are subject to the benefits of this proposal, as are salmonids and other aquatic species of concern to CALFED.

The primary expected benefit of this project is improved water quality for all beneficial uses of Bay-Delta waters, including municipal, industrial, agricultural, esthetic, and ecological uses. The measures of these benefits are mostly beyond the capabilities and focus of this project except for the ability to measure the efficacy of our educational/remediation effort through the monitoring component of this work. Our toxicology expertise will allow us to translate measures of reduced inflows of specific pesticides into improved survival estimates of specific foodchain organisms currently threatened in the watersheds that will be targeted.

No significant third-party benefits are anticipated at this time.

d. Background and Biological/Technical Justification

Distinct pulses of diazinon and chlorpyrifos were detected in the San Joaquin River in January and February of this year, and in the Sacramento River in February; all pulses followed rainfall events. By contrast, the pattern of detection in the Delta showed a steady increase in concentration throughout the same period. Water samples collected during these periods typically prove to be acutely toxic to *Ceriodaphnia dubia* and in excess of National Academy of Sciences guidelines. An approach is needed to enable scientists and resource managers to discern whether programs to reduce offsite movement of pesticides actually equate to improved water quality. By initially concentrating on diazinon and chlorpyrifos, our team expects to enhance protection of the Bay-Delta water resource while offering sufficient pest control to sustain yield and quality of agricultural production.

This project will fill a major information gap relative to alternative agricultural practices involving pesticides. There currently is no single source for displaying the current knowledge of pesticides and alternative practices that reflect the California situation in terms of efficacy, economics, pest specificity, environmental/climatic constraints on use, and environmental impacts/risks. The matrix documents developed by this project will reflect current knowledge of the above variables in easy to understand formats specific to each crop/use and pest in question. Additionally, matrix design will highlight areas where knowledge is lacking, thus identifying areas that merit future research emphasis.

The products and procedures basic to this proposal are characterized by adaptability and longevity of their benefits. Matrix materials will be easily updated as new information is developed on alternatives and the variables that influence their economics, efficacy, and environmental impacts. Outreach programs based on matrix materials will improve as available information improves. Monitoring studies will reflect and adapt to data from previous monitoring studies and, perhaps more importantly, will examine emerging alternative practices (new families of pesticides and non-chemical pest control strategies) which may be promoted as replacements for conventional practices.

e. Proposed Scope of Work

All Phase II work will be completed by the end of the year in 2000. Progress and final reports will be provided at the end of the year in 1998, 1999 and 2000, respectively.

The urban component of this project represents efforts to establish the most appropriate priority of audiences to address relative to the two pesticides of immediate concern, and the most appropriate means of gaining access to these audiences. Future phases of the overall program will build on the results of Phase II efforts to include additional audiences, additional pesticides and applications, and strengthen our monitoring efforts.

The agricultural component of the proposed work will represent expansion of Phase I goals to include in-season as well as dormant applications of two pesticides of immediate concern. Future phases of the overall program will further expand matrix material and corresponding training sessions to include other pesticides, other crops and urban uses, and additional monitoring studies.

f. Monitoring and Data Evaluation

For the component of this project dealing with alternative practices information synthesis (matrix), steering committee representatives from state water agencies (SWRCB, DPR), grower organizations, the California Agricultural Production Consultants Association (CAPCA), and U.C. expertise will serve as the peer review body.

Once the matrix training materials are approved and training workshops have been offered, a monitoring program will establish measures of efficacy for the program, the input and output pesticide variables of the study site, and the pest control efficacy and water quality influences of the alternative methods under study. For both the agricultural and urban monitoring components of this project, specific criteria for user and site selection will be established.

To monitor education/outreach efficacy, a comprehensive questionnaire will determine the types of alternative practices incorporated, the resultant reduction in amount of specific pesticides used, the amounts of alternative product used (if any), the acreages affected by the alternative practice, and the specific aquatic system(s) draining these acreages. This information, coupled with pest and water quality monitoring, will provide quantitative measures of efficacy.

The education/outreach program is expected to enhance identification of producers with the willingness and ability to make their production resources available to members of the research community. Monitoring will be specific to the issues of alternative methods of pest management, and will take place within production circumstances which best address the variables identified in the matrix.

g. Implementability

Implementation is the cornerstone of this proposal. No other agency or institution has the combined strength of research and outreach capability resident within the University of California. We possess the information that can be compiled from the various sources to produce the synthesis of current information. We possess the Cooperative Extension network with its accompanying long-term history of successful outreach programs to producer/cooperator clientele. We possess the research capabilities which have thus far provided the majority of analytical data for many of the past and current agency monitoring programs. We are a principal source of alternative practice technologies, especially non-chemical approaches.

The UC Statewide IPM Project has a 17 year history of working with growers and their consultants to improve pest management practices in California, and to develop and implement new practices that are economically, environmentally, and socially acceptable.

The UC Davis Aquatic Toxicology Laboratory is a laboratory fully certified by the State of California. We have a total of 11 years of continuous experience in Northern California. Monitoring projects in the Sacramento and San Joaquin watersheds have reached from the upper Sacramento to Stanislaus County in the south and include a border rivers project involving the Colorado River and the Salton Sea. The laboratory has eight years of TIE evaluation experience and is fully staffed and equipped for the level of monitoring effort requested.

IV. Costs and Schedule to Implement Proposed Project

a. Table 1: Budget Costs -- Total budget for 3 years:

Project Phase and Task	Direct Labor Hours	Direct Salary and Benefits	Overhead Labor (General, Admin and Fee)	Service Contracts	Material and Acquisition Contracts	Misc and Other Direct Costs	Total Costs
Task 1: Toxicology Monitoring		176,817	57,447	357,000	33,150	Travel 7,500	631,914
Task 2: Pest Management Monitoring		223,765	24,701		6,750	Travel 16,500	271,716
Task 3: Evaluation and Outreach		31,228	4,923		2,000	Travel 16,000	54,151

SPECIFIC BUDGET BREAKDOWN BY TASK

Toxicology Monitoring

County Salary + Benefits	58,066	
County Travel	7,500	
County Supplies	750	
Laboratory Salary + Benefits	118,751	
Laboratory Supplies	32,400	
Synthetic Pesticide & TIE Development	24,000	
Toxicology Monitoring	243,000	
Analytical Chemistry	90,000	
SUBTOTAL		574,467

Pest Management Monitoring

County Salary + Benefits	58,066	
County Travel	7,500	
County Supplies	750	
IPM Salary	165,699	
IPM Travel	9,000	
IPM Supplies	6,000	
SUBTOTAL		247,015

Evaluation and Outreach

County General Assistance	21,000	
County Travel	15,000	
Sociologist Salary	10,228	
Sociologist Travel	1,000	
Sociologist Supplies	2,000	
SUBTOTAL		49,228

TOTAL	\$870,710
OVERHEAD (10%)	87,071
GRAND TOTAL	\$957,781

Incremental funding (yearly) for this project could be accommodated, but it is important to understand that there is currently no other potential source of funds to support this project/program at the scale we believe to be vital to its long-term success. Additionally, any break in funding will seriously threaten the necessary continuity of the monitoring studies in particular. We urge CALFED to commit to fully fund this proposal for the requested 3 year duration.

For incremental (yearly) funding, all task budget categories lend themselves to simple division into thirds by year.

b. Schedule Milestones

For Task 1, Information Synthesis, efforts are already underway for diazinon and chlorpyrifos used as dormant sprays. Funding of this proposal will allow concurrent expansion of material to cover in-season and urban uses. Dormant information will be available Fall of 1997, in-season and urban information will be available Fall of 1998.

For Task 2, Education/Outreach, training for dormant users will begin Fall 1997, in-season users Winter 1998, and urban users Winter 1998. All training sessions will be repeated on an annual cycle.

For Task 3, Monitoring, outreach efficacy measures will follow each training session for dormant, in-season, and urban users. Pest efficacy and water quality monitoring for dormant alternatives versus traditional practices will begin Winter of 1997 and each Winter through 2000. In-season monitoring will begin Spring/Summer 1998 and each in-season period through 2000.

c. Third Party Impacts: No significant third party impacts are anticipated at this time.

V. Applicant Qualifications

ORGANIZATIONAL STRUCTURE

A Staff Research Associate IV (SRA), with 25 years of Cooperative Extension experience in project coordination and outreach programs will have first-line responsibility for day-to-day project management. This individual will coordinate development and draft the information synthesis (matrix) materials, will facilitate administration of outreach workshops, and will provide technical assistance to Cooperative Extension personnel and faculty performing sample collection and data analysis for all monitoring studies.

Post-Graduate researchers will assist Cooperative Extension and laboratory personnel in the routine procedures of sample collection and analysis. The Stanislaus County Cooperative Extension Director will supervise and direct the efforts of his personnel involved with monitoring studies.

All technical staff will serve under the general direction of the principal investigators (PIs) to whom they will provide frequent updates and summaries of task progress. The PIs will provide frequent review of analytical data.

The PIs and the SRA will work with the Steering Committee to maintain focus on goals and provide adaptive procedural corrections as warranted. The Steering Committee will also serve as the peer review body for information synthesis documents.

The SRA will draft all interim and final reports under the direction of the PIs.

Dr. FRANK ZALOM, Director, Integrated Pest Management Project, U.C. Davis (UCIPM).

The UCIPM Project was awarded a National Environmental Achievement Award from Renew America, a consortium of environmental groups. It was recognized by a California Legislature Joint Resolution for successful efforts to improve pest management practices on the occasion of its 15th anniversary in 1994.

Dr. Zalom, also on the faculty of the Department of Entomology, conducts research and extension activities on horticultural crops. He has published over 250 technical, semi-technical, and popular articles on various aspects of insect biology and control. He was elected a Fellow of the California Academy of Sciences in 1990. He was awarded a Fulbright Senior Research Fellowship to Spain in 1992-93, the Distinguished Achievement Award in Extension from the Entomological Society of America in 1992, the University of California Assembly Council's "Outstanding Specialist Research" (1986) and "Creative Teamwork" (1991) awards, and the American Registry of Professional Entomologists "Excellence in Entomology Award" (1989).

Dr. DAVID HINTON, Professor and Leader, UC Systemwide Graduate Program in Ecotoxicology, U.C. Davis

Dr. Hinton is a cell biologist/aquatic toxicologist and professor of aquatic toxicology in the Department of Veterinary Anatomy, Physiology and Cell Biology, University of California, Davis. He has 27 years of experience in developing and applying biomarkers of exposure and deleterious effect in fishes exposed to various pollutants including oil.

Dr. Hinton's major interests are correlated morphologic and biochemical studies of the responses of teleosts to aquatic pollutants. He is a member of the Society of Toxicologic

Pathologists, the Society of Toxicology, the International Academy of Pathology, the Society of Environmental Toxicology and Chemistry, and the American Association of Cancer Researchers. At Davis, Dr. Hinton has chaired the Graduate Group in Pharmacology and Toxicology and he is Director of the University of California System-Wide Graduate Training and Research Program in Ecotoxicology. Dr. Hinton is a participating faculty in the United States Environmental Protection Agency - UC Davis Center for Ecological Health Research; the National Institute of Environmental Health Sciences - UC Davis Superfund Basic Science Research Program and leads a large effort on inland surface water toxicity studies funded by various State of California agencies. Professor Hinton has authored or co-authored 147 papers in national and international journals and 99 abstracts of presentations at various meetings. He is the principal author of the SETAC Publication on Biomarkers, Chapter on Histopathologic Biomarkers. He has served as an expert scientist on NOAA Damage Assessment in the Los Angeles Bight. An associate editor of *Anatomical Record* and *Toxicologic Pathology*, Dr. Hinton is on the editorial board of, and is a referee for, a number of other international journals. He is editor-in-chief of *Aquatic Toxicology*. He has worked with Dr. Zalom for 2 years in coordination of monitoring and toxicity studies of pesticides with integrative pest management programs.

Dr. DON ERMAN, Director, Centers for Water and Wildland Resources, U.C. Davis (CWWR).

The CWWR is a multi-campus research unit and special program charged with fostering and supporting research and extension activities relating to the conservation, management, and utilization of aquatic and terrestrial natural resources.

Dr. Erman, also professor of fisheries ecology in the Wildlife, Fish & Conservation Biology Department, conducts research on impacts of land use on aquatic systems. He maintains active roles with American Fisheries Society, American Institute of Biological Scientists, American Society of Limnology and Oceanography, Ecological Society of America, and Sigma Xi. In 1990, he was elected a Fellow of the California Academy of Sciences. From 1993-96, in addition to his other duties, he served as Science Team Leader for the \$7 million Congressionally-mandated Sierra Nevada Ecosystem Project. He also serves as U.C. representative to the California Biodiversity Council.

VI. Compliance with Standard Terms and Conditions

VI. Compliance with standard terms and conditions. In accordance with instructions, enclosed is a signed Non-Discrimination Compliance Statement. There were no objections noted to the Standard Clauses--Contracts with Public Entities, but certain of the Terms and Conditions cited under Attachment D in the RFP may not be consistent with University of California policy or with existing agreed-upon provisions between the University and State of California agencies. Accordingly, the University would probably request deviation from such terms and conditions in the event an award is made under this program:

Payment Schedule: We anticipate that payment conditions and schedules would be compatible with the standard University procedures for billing extramural sponsors. The use of non-standard invoice forms and procedures creates unnecessary, excessive expenses. Therefore, an acceptable invoicing clause should provide for invoicing and financial reporting in accordance with the University's major cost categories (such as "salary", "supplies", "travel", etc.). It should be noted that the University's accounting system does not track expenditures by task in the manner indicated by the proposal budget. More detailed and source accounting documents are maintained by the University and made available in case of an audit which would be conducted at the request and expense of the sponsor. Also, to avoid the expenditure of University funds prior to receipt of grant or contract funds, it is University policy to obtain advance payments whenever possible.

Substitution: A substitution clause such as the one stated in Attachment D to the RFP could possibly infringe on the University's hiring practices and procurement regulations by allowing the State to require substitution of individuals or subcontractors. It may also create substantial unfunded liability for the University.

Rights in Data: Under UC policy, ownership to all data, research results, documents, copyrights and other intangibles is retained by the University and freedom to publish or disseminate research results is a major criterion of the appropriateness of sponsored projects. Any limitation on the use of research findings or information is strictly discouraged. It is possible to make a limited exception which would provide an extramural sponsor with a right to review publications for a reasonable time prior to issuance. However, it is clearly contrary to policy and would be unacceptable to assign the decision of what may be published by allowing *approval* by a sponsor. Furthermore, it may not be legally permissible under State laws which may require disclosure of all public records maintained by the University.

Indemnification: The State's Office of Risk and Insurance Management has reached agreement on a standard indemnity clause to be used between the State and the University. A copy of this provision is available for review upon request.

Termination: These provisions cited under Attachment D could create an unfunded liability for the University as the State may refuse to reimburse the University for costs already incurred on behalf of the State. UC must be able to cover its costs in the event of untimely termination. In such cases, the State should agree to reimburse the University for costs or other obligations incurred prior to the effective date of cancellation. Also, it is usual for UC to have a mutual right to terminate the agreement if the project becomes impossible for the University to complete.

NONDISCRIMINATION COMPLIANCE STATEMENT

COMPANY NAME

The Regents of the University of California

The company named above (hereinafter referred to as "prospective contractor") hereby certifies, unless specifically exempted, compliance with Government Code Section 12990 (a-f) and California Code of Regulations, Title 2, Division 4, Chapter 5 in matters relating to reporting requirements and the development, implementation and maintenance of a Nondiscrimination Program. Prospective contractor agrees not to unlawfully discriminate, harass or allow harassment against any employee or applicant for employment because of sex, race, color, ancestry, religious creed, national origin, disability (including HIV and AIDS), medical condition (cancer), age, marital status, denial of family and medical care leave and denial of pregnancy disability leave.

CERTIFICATION

I, the official named below, hereby swear that I am duly authorized to legally bind the prospective contractor to the above described certification. I am fully aware that this certification, executed on the date and in the county below, is made under penalty of perjury under the laws of the State of California.

OFFICIAL'S NAME

Carol Berman

DATE EXECUTED

7/25/97

EXECUTED IN THE COUNTY OF

Alameda

PROSPECTIVE CONTRACTOR'S SIGNATURE



PROSPECTIVE CONTRACTOR'S TITLE

Contracts & Grants Coordinator

PROSPECTIVE CONTRACTOR'S LEGAL BUSINESS NAME

The Regents of the University of California

DWR WAREHOUSE

Basso Bridge Ecological Reserve Land Acquisition
Tuolumne County - 42 Acres JUL 28 PM 2:00

I. Executive Summary

Applicant California Department of Fish and Game (DFG)
 Region 4
 1234 East Shaw Avenue
 Fresno, California 93710

Project Description and Primary Biological/Ecological Objectives

This would be a land purchase to consolidate habitat protection along the south bank of the Tuolumne River between La Grange Dam and Basso Bridge. This area contains primarily seasonal wetland and aquatic habitat and instream aquatic habitat as well as some shaded riverine aquatic habitat. The purposes of this purchase are to help protect spawning riffles in the area, enhance riparian habitats and provide protection to some riparian species.

Approach/Tasks/Schedules

This will be a purchase of property. Habitat restoration activities that may occur on the property would be actions taken through participation with the Wildlife Conservation Board (WCB), Stanislaus County or the Tuolumne River Technical Advisory Committee (TRTAC) and are not planned as part of this project. Purchase should be completed by December 1998 and a management plan completed during 1999.

Justification for Project and Funding by CALFED

This purchase would allow other potential CALFED-FUNDED ecosystem restoration projects in this area to reach more of their full potential. This will also help to protect several habitat types. Both seasonal wetland and aquatic habitats as well as some shaded riverine aquatic habitat occur on these properties. This would occur in part because it will allow more control on some activities (e.g., cattle grazing) in the area since the south bank would be entirely in public ownership.

Budget Costs and Third Party Impacts

A budget of \$172,500 is needed to carry out the purchase which would be performed by the WCB. There will be some improvements in accessibility to the public. It will also enhance ecosystem restoration actions by other parties, planned for this area and is supported by these groups.

Applicants Qualifications

The DFG manages 821,017 acres of land. The DFG Region 4's anadromous fisheries staff has work closely with the various other state, federal and private personnel, to construct chinook salmon spawning, rearing and predator pond isolation projects in the San Joaquin River basin over the past 10 years. The DFG has the clerical, fiscal and contractual personnel necessary to support the biological and technical experts administering this project.

Monitoring and Data Evaluation

This project will not require these activities as it will simply be a land purchase with no further restoration proposed at this time. A management plan will be developed for the area as is required for all DFG properties.

Local Support/Coordination w/ other Projects/Compatibility with CALFED Objectives

There is local support for the purchase from angling groups and agencies. Stanislaus County has indicated support for the purchase. The project will fulfill the objectives of the CALFED program by improving and increasing the aquatic and terrestrial habitats in the San Joaquin Valley. This acquisition is part of a larger ecosystem restoration plan by the DFG and other interested parties on the Tuolumne River. As such, it is an integral part of such restoration plans.

**Basso Bridge Ecological Reserve Land Acquisition
Tuolumne County - 42 Acres**

II. Title Page

Applicant California Department of Fish and Game (DFG)
Region 4 - Tuolumne River Restoration Center
P.O. Box 10
La Grange, California 95329
Telephone (209) 853-2533
Fax (209) 853-9017

Type Organization Public Agency

Contact Person Mr. Tim Heyne

RFP Project Type Land Acquisition

III. Project Description

Project Description and Approach

Three parcels are recommended for acquisition in this document. These three parcels, which total 41.6 acres, are the only remaining private parcels on the southeast side of the Tuolumne River between the La Grange Road Bridge and the Basso Bridge, a distance of approximately 1.5 miles (Attachment 1). The property contains some fine valley oaks, in addition to the seasonal wetland and aquatic habitat, and shaded riverine aquatic habitats. Ecological Reserve status for this acquisition is recommended as it will become a "bridge" to secure important riparian and salmon spawning habitats on public property owned by Stanislaus County, both up and downstream of these parcels. These parcels would be purchased through the WCB using the DFG land acquisition process.

Geographical Location and Description

Stanislaus County Assessor's Parcel Numbers:

8-16-16	26.0 acres	T.3S	R.13E	Sec. 24
8-16-15	6.4 acres	T.3S	R.13E	Sec. 24
8-16-10	9.2 acres	T.3S	R.14E	Sec. 19

These parcels are located in eastern Stanislaus County starting approximately 1 mile west of the town of La Grange adjacent to the old historic roadside cemetery. They extend between State Highway 132 and the Tuolumne River downstream to the Section line between Sections 24 and 25 (see Attachment 1). This location is approximately ½ mile upstream from the old Basso Bridge. Since the parcels 8-16-15 and 8-16-16 abut Highway 132, access is direct from the Highway. Access to parcel 8-16-10 is either through 8-16-15 from the west or through Stanislaus County property to the east. The County-owned parcel to the west, while not formally named, as is the Joe Domecq Wilderness area to the south, is commonly referred to as the Basso Bridge area. The old and new Basso bridges are located within ½ mile downstream of the property. For these reasons it is suggested the area be named the Basso Bridge Ecological Reserve.

The property contains some fine valley oaks, in addition to the instream aquatic, seasonal wetland and aquatic, and shaded riverine aquatic habitats. Historical use of at least portions of the property was for gold mining by floating dredge. Besides natural habitat values, cattle grazing is the only other use that has been made of the property in recent years. Improvements on the property have been limited to fencing for cattle containment purposes. Elevations range from 200 to approximately 180 feet above sea level with topography typical of the Tuolumne River flood plain terrace. During 1995 and 1996, much of the property was flooded by the river when releases from New Don Pedro Dam were in the 10,000+ and 50,000+ cfs ranges, respectively.

Expected Benefits

The parcels are the critical "missing links" between 350+ acres of County- owned land to the west and 185+ acres of County-owned land to the east. A direct consideration for purchase of these parcels is protection and enhancement of the riparian corridor, which would result from this acquisition. Cattle grazing along this riparian corridor limits maximum expansion of the corridor and would be a desirable practice to manage. The river portion of this property is prime fall-run chinook salmon spawning habitat and is within the "designated salmon spawning area" defined in Fish and Game Code Section 1505. In 1994, the DFG, in conjunction with Department of Water Resources, reconstructed a salmon spawning riffle adjacent to this acquisition. The parcels abut the Tuolumne River and State Highway 132 and would provide continuous public access of the river and public riparian lands for 1.5 miles below the historic town of La Grange.

Background and Biological/Technical Justification

Increased water usage, linked to population growth, agricultural production and gravel mining have caused severe losses to the riparian habitat of the San Joaquin Valley. San Joaquin Basin chinook salmon populations have also declined to seriously low levels in recent years. Legislation has been passed that mandates restoration of anadromous fish populations in the Central Valley, including the San Joaquin River basin. Most of the work necessary to restore these populations has centered around salmon spawning and rearing habitat restoration.

The purpose of this acquisition is twofold. First is to acquire and protect instream aquatic, seasonal wetland and aquatic, and shaded riverine aquatic habitats along an important salmon spawning reach of the Tuolumne River. Secondly, this acquisition secures "inholdings" and places 1.5 miles of riparian habitat and associated salmon spawning area into public ownership along this stretch of the Tuolumne River. The acquisition would augment the value of the Tuolumne River Restoration Center, a DFG research and restoration facility that is located nearby.

Proposed Scope of Work

The proposal to purchase the property will be submitted through DFG's land acquisition process. Simultaneously, the land owners will be contacted to indicate that funding will be available and initiate negotiations. DFG, assisted by the Wildlife Conservation Board (WCB), would address any issues that might prevent DFG from achieving the objectives of this land acquisition. Once a purchase price is finalized and the funding is available then the WCB would complete the purchase. Full fee acquisition is recommended for these parcels.

Monitoring and Evaluation

This project will not require these activities as it will simply be a land purchase with no further restoration activities proposed at this time. A management plan will be developed

for the area as is required for all DFG properties. This management plan will need to be coordinated with Stanislaus County.

Implementability

Property owners as per Stanislaus County Assessor's records are as follows:

APN 008-16-10	Ingalls Hollis P.O. Box 65 La Grange, California 95329
APN 008-16-15	Ingalls Hollis P.O. Box 65 La Grange, California 95329
APN 008-16-16	Brent Vaughn Et Al 6036 Smith Road Oakdale, California 95361-9782

According to Stephanie Larsen, Park Planner for Stanislaus County, both owners have indicated to her that they would be willing sellers. Actual sales price is unknown, but Stephanie Larsen believes that all three parcels could be purchased for less than \$100,000.

Encumbrances: The most recent deeds recorded in Stanislaus County were checked and no mention was made of any mineral or water rights, access or easements. There appear to be many records extending back into the 1800's which are recorded regarding these parcels and which may or may not refer to these rights.

There would be essentially no operations and maintenance expenses of any consequence associated with this purchase although the management plan will need to be coordinated with the county.

Public Use - Public access is available directly from the highway and from adjacent County Park property. No development is necessary or desired at this time.

Personnel requirements would be minimal as the area would be patrolled by Stanislaus County Department of Parks and Recreation (SCDPR) personnel on a regular basis. Since the parcels are adjacent to Highway 132, inspection would be made any time any Department personnel transit the area, which is quite frequently.

Basso Bridge Ecological Reserve Land Acquisition Tuolumne County - 42 Acres

IV. Cost and Schedule to Implement Proposed Project

Budget Costs

	Direct Labor Hours	Direct Salary Benefits	Admin/ Indirect Costs @ 23%	Service Contract	Acquisition	Misc.	TOTAL
Purchase	160	\$5,350.00	\$32,500.00	\$30,000.00	\$100,000.00		\$162,500.00
	AFB			WCB			
SUBTOTAL							\$162,500.00
Contingency						\$10,000.00	\$10,000.00
TOTAL							\$172,500.00

AFB - Associate Fishery Biologist - this cost is not included in cost of the project as it will be a DFG match.

WCB - Wildlife Conservation Board

Scheduling Milestones and Incremental Funding

These purchases should be completed by the end of 1998. A management plan will be produced for the area by the end of 1999. The management plan is not however, a deliverable with this contract. It is required for any lands the DFG purchases.

Third Party Impacts

There is no known opposition to this purchase. Support exists from the SCDPR, the Stanislaus County Fish and Wildlife Committee, local environmental groups and the TRTAC. Support for the Tuolumne River Restoration Center land acquisition by local communities and agencies was good and should bolster advocacy for this acquisition.

V. Applicants Qualifications

The DFG manages 821,017 acres of land, including 103 wildlife areas, 99 ecological reserves and 166 public access sites. Many wildlife areas and reserves protect species at risk. During the 1995-96 the WCB, the real estate arm of the DFG, authorized \$14.8 million for land acquisition and \$3.5 million for development and restoration projects. The DFG's Environmental Services staff reviews a variety of environmental documents for land and water projects that may affect fish and wildlife, and during 1995-96 processed about 13,000 of these documents and projects. Biologists and botanists

conduct hundreds of studies, surveys, censuses, and other sampling programs annually to assess the state's fish, wildlife and habitat resources.

DFG's Region 4 anadromous fishery staff administered 1.5 million dollars in the 1995-96 fiscal year. Region 4 staff has been named contract managers for several restorations, revegetation, fish screening and fish research projects. The staff has work closely with the various other state, federal and private personnel, to construct chinook salmon spawning, rearing and predator pond isolation project in the San Joaquin River basin.

The DFG has the clerical, fiscal and contractual personnel necessary to support the biological and technical experts administering this project.

The DFG Region 4 staff assigned to implement the Basso Bridge Ecological Reserve Land Acquisition are:

Mr. Bill Loudermilk, Senior Fisheries Biologist (M/F). Mr. Loudermilk will be responsible for the overall project including supervision, budgeting and contracting.

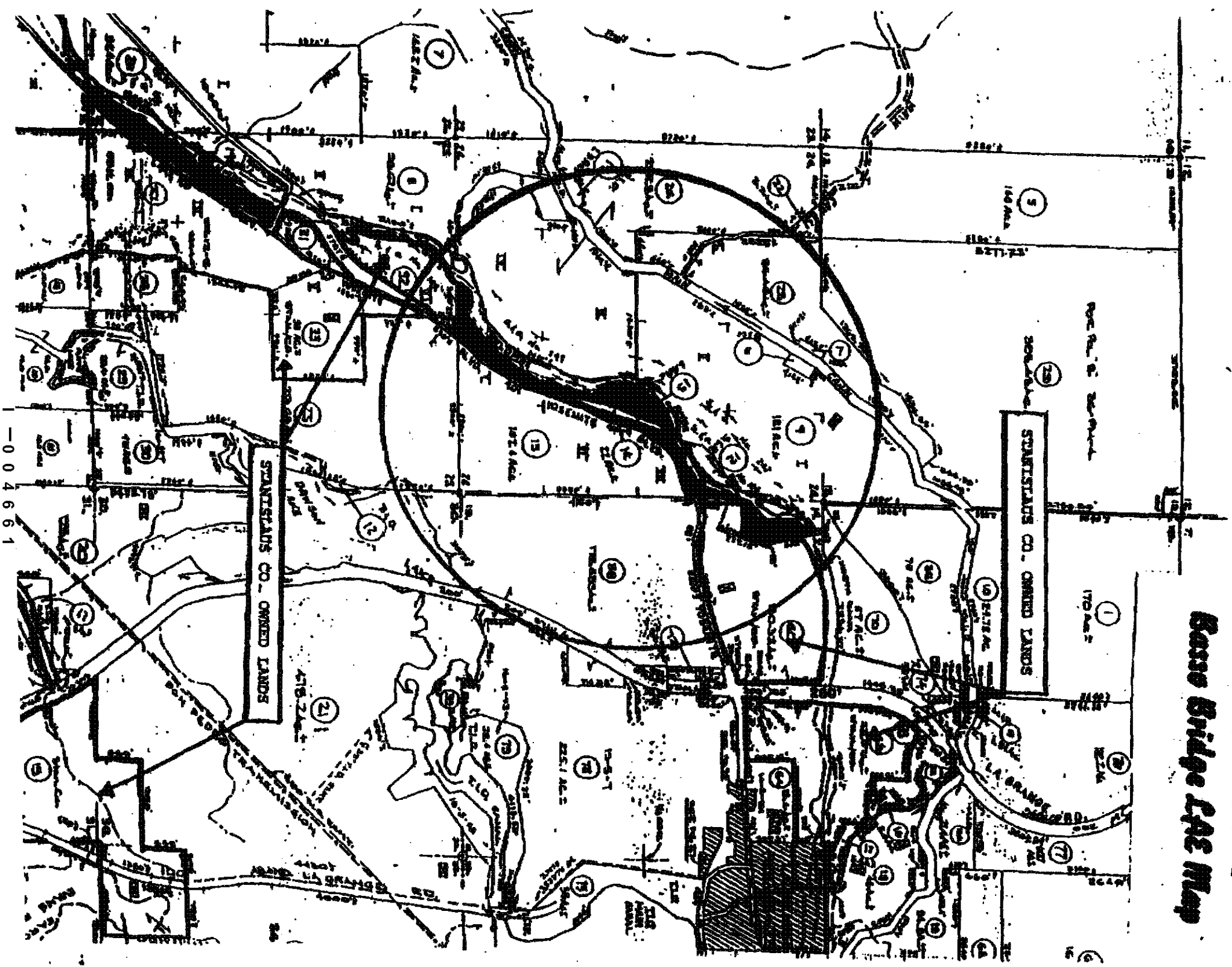
Mr. Tim Heyne, Associate Fisheries Biologist (M/F). Mr. Heyne will assist in these responsibilities and specifically develop the contract with the WCB to purchase the acquisition.

VI. Compliance with Standard Terms

The DFG is a public agency and will comply with appropriate terms and conditions pursuant to policy, regulation and law.

ATTACHMENT I

Base Bridge L&E Map



-004661